

WHAT IS CLAIMED IS:

1. A ball valve, comprising:
a valve body defining an inner seat and having a fluid inlet and fluid outlet; and
5 a control ball element rotatably mounted in the inner seat, and having
a partially spherical outer surface,
a flow passage through said ball element having disposed on an upstream end of said
flow passage,
a leading edge,
10 a first inner control surface abutting the leading edge, and
a second inner control surface abutting the leading edge at an angle oblique to the
first inner control surface;
2. The ball valve of claim 1, wherein the first inner control surface comprises a cylindrical
15 surface having a first longitudinal axis and the second inner control surface comprises a
cylindrical surface having a second longitudinal axis
3. The ball valve of claim 2, wherein the first longitudinal axis is at an angle to the second
longitudinal axis.
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4. The ball valve of claim 3, wherein the angle between the first longitudinal axis and the
second longitudinal axis is about nine degrees.
5. The ball valve of claim 3, wherein the angle between the first longitudinal axis and the
25 second longitudinal axis is between about six degrees and about twelve degrees.
6. The ball valve of claim 1, wherein the leading edge comprises a v-formation, and
symmetric segments on each side of the v-formation.

7. The ball valve of claim 1, further comprising a control shaft attached to the control ball element, and an actuator configured to rotate the control shaft in response to a control signal.
- 5 8. The ball valve of claim 1, wherein the control ball element comprises a trailing edge abutting the first inner control surface, but not the second inner control surface.
9. The ball valve of claim 1, further comprising a pair of descending ears on the control ball element, wherein each ear defines a cylindrical passage.
- 10 10. The ball valve of claim 9, further comprising a pair of cylindrical extensions, wherein each extension is attached to a respective ear of the control ball element.
11. A control ball element, comprising:
15 a ball segment having a partially spherical outer surface;
a leading edge on the ball segment; and
a flow passage through said ball element having
a first inner control surface on the ball segment and adjacent the leading edge, and
a second inner control surface on the ball segment and abutting the leading edge at an
20 angle to the first inner control surface.
12. The control ball element of claim 11, wherein the first inner control surface comprises a cylindrical surface having a first longitudinal axis and the second inner control surface comprises a cylindrical surface having a second longitudinal axis
- 25 13. The control ball element of claim 12, wherein the first longitudinal axis is at an oblique angle to the second longitudinal axis.
14. The control ball element of claim 13, wherein the angle between the first longitudinal
30 axis and the second longitudinal axis is about nine degrees.

15. The control ball element of claim 13, wherein the angle between the first longitudinal axis and the second longitudinal axis is between about six degrees and about twelve degrees.

5 16. The control ball element of claim 11, wherein the leading edge comprises a v-formation and symmetric segments on each side of the v-formation.

17. The control ball element of claim 11, wherein the ball segment comprises a trailing edge abutting the first inner control surface, but not the second inner control surface.

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18. The control ball element of claim 11, further comprising a pair of ears descending from opposing sides of the ball segment.

19. A ball valve element, comprising:

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a ball segment having a substantially spherical outer surface;

a top segment on a front edge of the ball segment and defining a top segment centerline;

a pair of flaring segments defining a first leading edge on the ball segment, the flaring segments being symmetric to each other about the top segment centerline; and

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a pair of descending segments adjacent the flaring segments and symmetric to each other about the top segment centerline.

20. The ball valve element of claim 19, wherein the pair of descending segments are formed by the intersection of the outer surface, with a first inner surface of the ball segment.

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21. The ball valve element of claim 20, wherein the pair of flaring segments are formed by the intersection of the outer surface with a second inner surface of the ball segment.